

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION**

FACT SHEET

TENTATIVE ORDER NO. R9-2006-0064

**WASTE DISCHARGE REQUIREMENTS
FOR
FALLBROOK PUBLIC UTILITY DISTRICT
TREATMENT PLANT NO. 1
RECLAMATION PROJECT
SAN DIEGO COUNTY**

The basis for prohibitions, discharge specifications, other provisions, and the Monitoring and Reporting Program (MRP) contained in Tentative Order No. R9-2006-0064 have been provided in the Findings or within the Order itself. This Fact Sheet provides additional background information and technical details regarding the basis or development of discharge specifications, provisions, and MRP requirements.

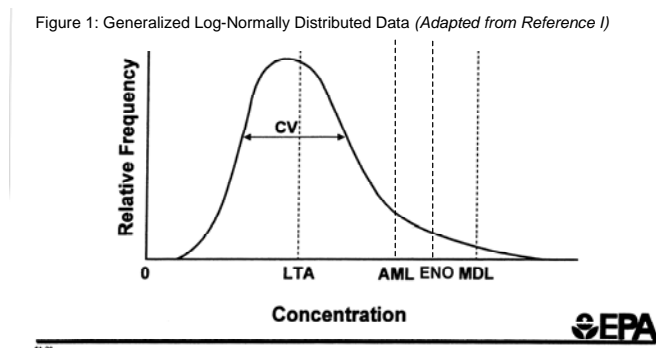
BASIS FOR DISCHARGE SPECIFICATIONS

Discharge specifications based on groundwater water quality objectives

Table 3.1 of the Water Quality Control Plan for the San Diego (Basin Plan) contains numerical groundwater water quality objectives for certain inorganic constituents which are expressed as values not to be exceeded more than 10 percent of the time.

Footnote D to Table 3.1 applies to certain hydrologic areas and subareas, including HSAs 2.13, 3.11 and 3.12, and state that point sources will be controlled to achieve effluent quality corresponding to the tabulated numerical values. The numerical objectives are therefore applied directly to the effluent as effluent numerical objectives (ENO), and effluent discharge specifications were developed without consideration of dilution or assimilative capacity in the receiving groundwater.

The numerical objectives in Table 3.1, expressed as values not to be exceeded more than 10 percent of the time, are interpreted to mean that 90 percent of daily measurements are expected to be below the numerical objective. Consequently, the numerical objective represents the 90th percentile. In order to translate the numerical objectives into 12-month average and daily maximum effluent limitations, a statistical model was employed that is applicable to data sets that follow a log-normal distribution curve and can be uniquely characterized by a long-term average (LTA) and a coefficient of variation (CV, defined as the ratio of the standard deviation and the mean of the data set). The statistical model dictates that in order for effluent from FPUD Plant No.1 to comply with the effluent numerical objective, effluent concentration data must follow a log-normal distribution curve that includes the 90th percentile equivalent to the numerical objective and is characterized by a desired LTA and CV (see Figure 1).



Actual data from the period June 1999 to May 2004 for treated effluent from FPU D Plant No. 1 for the inorganic constituents (approximately 60 data points) were statistically analyzed using the software Minitab to determine if the effluent data approximated a log-normal distribution. An Excel spreadsheet was used to determine the CV of the data set for each effluent constituent. Using the CVs determined from the effluent data and the numerical objective representing the 90th percentile, the desired LTA was calculated using the following statistical equation:

$$LTA = ENO * \text{Exp} \left[\frac{1}{2} \sigma^2 - z_{90\text{th}} \sigma \right]$$

where $\sigma^2 = \ln [CV^2 + 1]$, $z_{90\text{th}} = 90^{\text{th}}$ percentile probability score, and ENO is the effluent numerical objective based on the groundwater objective.

The effluent maximum daily limitation (MDL), taken as the 99th percentile, was calculated using the following statistical equation:

$$MDL = LTA * \text{Exp} \left[-\frac{1}{2} \sigma^2 + z_{99\text{th}} \sigma \right]$$

where $\sigma^2 = \ln [CV^2 + 1]$ and $z_{99\text{th}} = 99^{\text{th}}$ percentile probability score.

The effluent 12-month average limitation (12MAL), based on the 95th percentile for the average of 12 monthly measurements, was calculated using the following statistical equation:

$$12 \text{ MAL} = LTA * \text{Exp} \left[-\frac{1}{2} \sigma_n^2 + z_{95\text{th}} \sigma_n \right]$$

where $\sigma_n^2 = \ln \left[\frac{CV^2}{\# \text{ samples}} + 1 \right]$ and $z_{95\text{th}} = 95^{\text{th}}$ percentile probability score.

Because groundwater in HSA 2.13 has different numerical water quality objectives than groundwater in HSAs 3.11 and 3.12 for the inorganic constituents, two sets of effluent discharge specifications have been calculated. The calculations for the individual inorganic constituents are summarized in Table 1 of this Fact Sheet.

The effluent discharge specification for total nitrogen is based on the groundwater numerical objective for nitrate (10 mg/L as NO₃ or 2.3 mg/L as N in HSA 2.13; 45 mg/L as NO₃ or 10 mg/L as N in HSA 3.11 and 3.12) with considerations for the transformation of nitrogen species. Nitrogen in treated effluent may be in nitrate form or in other forms (such as organic nitrogen, ammonia, nitrite) that eventually convert to nitrate. Once in nitrate form, some nitrogen is lost through denitrification in the unsaturated soil zone (vadose zone), but the majority remains as nitrate which will reach groundwater. Laboratory analysis indicated that nitrogen compounds in effluent from FPUD are approximately 50% in the form of nitrite or nitrate with the remainder as ammonia and organic nitrogen that have the potential to convert to nitrate. A typical denitrification rate of 30% has been applied in deriving the total nitrogen effluent discharge specification which is equivalent to stating that 70% of nitrates are expected to reach groundwater. Consequently, as an example, the effluent numerical objective (ENO) in HSA 2.13 for total nitrogen is 2.3 mg/L as N divided by the factor 0.7 which equals 3.3 mg/L as N. The amount of nitrate that reaches groundwater may be further reduced by vegetation uptake of nitrogen if followed by removal or harvesting of the vegetation; however, the total nitrogen discharge specification was derived with the assumption that vegetation is not removed from recycled water use sites.

The Basin Plan specifies that for discharges of recycled water upgradient of municipal water supply reservoirs, the effluent discharge specifications will be at levels that are not less than constituent concentrations of the water supply, but not more than the Basin Plan ground water quality objectives. The recycled water use areas in the Upper Ysidora (2.13) HSA are upgradient of municipal water supply reservoirs.

The Basin Plan specifies that for discharges of recycled water not upgradient of municipal water supply reservoirs, the effluent limitations will be at levels that are not less than constituent concentrations of water supply plus a typical incremental increase resulting from domestic water use, but not more than the Basin Plan ground water quality objectives. The recycled water use areas in the Mission (3.11) and Bonsall (3.12) HSAs are currently not upgradient of municipal water supply reservoirs. This Regional Board has accepted typical values for incremental increases in water for TDS, chloride and sulfate due to domestic water use. The effluent limitation that applies to the effluent from FPUD Plant No.1 discharged to HSAs 3.11 and 3.12 for these constituents is either the effluent limitation tabulated in Discharge Specification B.4 or a value equal to the concentration in the water supply plus the typical incremental increase, whichever is more stringent.

Discharge Specifications based on Title 22 Water Recycling Criteria

California Code of Regulations Title 22 Sections 60304 through 60307 stipulate the disinfection and turbidity levels to be achieved in recycled water depending on the intended use of the recycled water. While FPUD is not restricted by Order No. R9-2006-0064 as to the intended use of the recycled water that it distributes, FPUD currently supplies recycled water for irrigation to recycled water use sites subject to the provisions of Section 60304. Recycled water for purposes subject to Section 60304 must be a disinfected tertiary recycled water, as defined by Title 22 Section 60301.230,

which are the most stringent Title 22 standards. The discharge specifications for coliform, turbidity and CT (the product of chlorine residual and modal contact time) requirements contained in Order No. R9-2006-0064 are based on disinfected tertiary recycled water Title 22 requirements.

Discharge Specifications based on Water Quality Objectives for Municipal and Domestic Supply Beneficial Use Designation

The Basin Plan states that waters designated for use as domestic or municipal supply shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCL) specified in the California Code of Regulations, Title 22, Table 64431-A of Section 64431 (Primary MCL, Inorganic Chemicals), Table 64431-B of Section 64431 (Primary MCL, Fluoride), Table 64444-A of Section 64444 (Primary MCL, Organic Chemicals), and Table 64449-A of Section 64449 (Secondary Maximum Contaminant Levels, Consumer Acceptance Limits). The beneficial uses of the groundwater in HSAs 2.13, 3.11, and 3.12 include municipal supply.

FPUD provided a reasonable potential analysis (RPA) for many of the municipal supply inorganic and organic chemicals of concern in the Plant No.1 effluent as part of its NPDES permit renewal application. The RPA predicted the maximum concentration for many of these chemical constituents that could be expected to be observed in the effluent based on a statistical analysis of available Plant No. 1 effluent quality data. For several inorganic and organic chemicals, actual effluent data or the predicted maximum effluent concentration indicated the presence or potential to be present in FPUD effluent at levels above the respective MCL (see Table 2 of this Fact Sheet for calculations). Effluent limitations for these constituents in the effluent from FPUD Plant No. 1 are established to ensure that the groundwater in these HSAs meet the established water quality objectives based on MCLs. (Also see discussion under Groundwater Monitoring).

BASIS FOR MONITORING AND REPORTING REQUIREMENTS

Effluent Monitoring

Effluent monitoring is required for all constituents for which effluent limitations have been established. In addition, effluent monitoring is required for many of the inorganic and organic chemicals with water quality objectives based on drinking water maximum contaminant levels but without effluent limitations in the Order to confirm that effluent limitations are not warranted.

Groundwater Monitoring

Groundwater monitoring is required in order to determine if the discharge of recycled water is affecting groundwater quality in the vicinity of the recycled water use sites. The constituents required to be monitored include constituents that may impair the beneficial use of groundwater or indicate contributions of constituents from recycled water discharges.

At the time of preparation of the Tentative Order, groundwater data municipal supply inorganic and organic chemicals of concern was not available to allow determination

whether the discharge of recycled water from FPUD Plant No. 1 has impacted or has the potential to impact groundwater basins. Consequently, effluent limitations were not developed because assimilative capacity in the groundwater could not be considered. The Monitoring and Reporting Program of this Order will require periodic monitoring for these chemical constituents in the effluent and groundwater.

Surface Water Monitoring

Surface water monitoring is required in order to determine if the discharge of recycled water is affecting surface water quality in Fallbrook Creek and Ostrich Creek in the vicinity of the recycled water use sites either due to runoff or groundwater seepage into the creeks. The constituents required to be monitored include constituents that may impair the beneficial use of surface water or indicate contributions of constituents from recycled water discharges.

Potable Supply Water Monitoring

Potable supply water monitoring is required in order to define effluent limitations under Discharge Specification B.4 for those constituents with effluent limitations based on an incremental increase from domestic water use above supply concentrations.

LIST OF REFERENCE DOCUMENTS

The following documents provide the necessary references for the basis of Order No. R9-2006-0064:

- A. San Diego RWQCB's Order Nos. 91-39 and 2000-011 for FPUD.
- B. Report of Waste Discharge for Fallbrook Area Wastewater Reclamation Project submitted by Fallbrook Sanitary District (now FPUD) on April 10, 1990.
- C. Correspondence dated April 2, 2004 submitted by FPUD regarding Fallbrook Public Utility District, Renewal and Update of Order No. 91-39.
- D. NPDES Report of Waste Discharge (permit application) submitted by the FPUD on August 13, 2004, for Treatment Plant No. 1.
- E. The Water Quality Control Plan for the San Diego Basin (9) (Basin Plan), September 8, 1994.
- F. California Code of Regulations, Title 23, Chapter 15.
- G. California Water Code, Division 7
- H. California Code of Regulations, Title 22, Division 4, Chapter 3 Water Recycling Criteria
- I. U.S. EPA NPDES Permit Writers' Course Workbook, February 24-28, 2003.
- J. U.S. EPA NPDES Permit Writers' Manual, December 1996, EPA-833-B-96-003.
- K. California State Water Resources Control Board Administrative Procedures Manual, May 1998.
- L. *Wastewater Engineering: Treatment, Disposal, and Reuse*, Metcalf & Eddy, Inc., 3rd Edition
- M. *Onsite Wastewater Treatment Systems Manual*, February 2002, EPA/625/R-00/008